CENTER FOR BEAM PHYSICS SPECIAL SEMINAR

"Interaction of Fast-Rising Magnetic Fields with Plasmas"

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Wednesday, January 23, 2002, 4:00 PM
Albert Ghiorso Conference Room (71-264), LBNL

*** **Please note special day and time** ***

Abstract:

The interaction of fast-rising magnetic fields with a plasma prefilling the gap between two coaxial or planar electrodes is studied. Emission spectroscopy together with plasma doping techniques are used to obtain the time-dependent 2D distributions of the ion velocities, electron density, electron energy distribution, the magnetic field, and the amplitude and frequency of non-thermal electric fields. Magnetic field penetration and plasma reflection were found to occur simultaneously, accompanied by ion separation. The partitioning of the dissipated energy between the ions and the electrons is determined, together with the observation of non-Maxwellian electron energy distribution. Possible mechanisms for the observed rapid magnetic field penetration into the heavy-ion plasma in the context of Hall field theory, turbulence-induced anomalous collisionality, or the formation of small-scale density fluctuations are discussed.